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ACCELERATING OIL ACQUISITION FOR THE STRATEGIC PETROLEUM RESERVE

Staff Working Paper

The Congress of the United States
Congressional Budget Office

May 18, 1982

J932-59

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INTRODUCTION

The Congress is considering legislation to accelerate the acquisition of oil for the U.S. Strategic Petroleum Reserve (SPR). The SPR, created by the Energy Policy and Conservation Act of 1975, is designed to provide a standby source of oil in the event of an oil supply disruption. Since its inception, however, the reserve's development has been slowed by technical, political, and economic factors. The reserve now contains about 250 million barrels of oil, about one-third of the currently planned 750 million barrel capacity and one-quarter of the 1 billion barrel reserve authorized by the Congress.

In the Omnibus Budget Reconciliation Act of 1981, the Congress reinforced its support for the SPR by establishing a target fill rate of 300,000 barrels per day (B/D). Although during fiscal year 1981 the fill rate averaged approximately 292,000 B/D, the rate set forth in the President's 1983 budget proposal varies annually from 150,000 B/D to 225,000 B/D during the 1980s. These plans, which call for continued expansion and development of underground storage facilities, would result in 500 million barrels of capacity in 1986 and 750 million barrels in 1990. By contrast, purchasing oil at the target rate of 300,000 B/D would accumulate oil much faster--the 500 million barrel mark would be met in early 1985 and the 750 million barrel target in 1987.

But the target rate cannot be achieved under the current program of mining and leaching underground caverns. A fill rate of 300,000 B/D would require additional storage facilities. Since this is a period of excess world oil production and stable real world prices, more rapid SPR oil purchases might achieve oil cost savings and provide earlier protection against oil supply disruptions. But to do so would require temporary storage facilities.

This paper discusses the use of such temporary facilities to expand capacity. In general, it concludes that oil could be acquired more rapidly than the current SPR schedule suggests, but probably at additional cost. If real oil prices should begin to rise again, the savings realized by early oil acquisition would offset some of the additional costs of leasing temporary storage capacity. Cost projections are made uncertain, however by the range of possible future prices. This uncertainty generally exceeds the

additional costs of utilizing temporary storage capacity. Nevertheless, purchasing oil at a higher rate than planned, and utilizing temporary storage, would provide additional protection against oil supply disruptions and provide it sooner.

CURRENT PLANS

SPR construction is proceeding in three phases. Phase I of the SPR plan has provided the first 250 million barrels of storage capacity. It includes surface facilities for handling the oil and underground solution-mined salt caverns or mines for storing the oil. The construction of these facilities is completed and the capacity full.

Phase II consists of an additional 290 million barrels of capacity--approximately 205 million barrels of capacity by the end of fiscal year 1985, with the remaining 85 million barrels becoming available in 1986 and 1987. For the most part, construction of surface facilities is complete, with underground solution mining progressing.

Phase III, as detailed in the President's 1983 budget request, would add an additional 210 million barrels of capacity by 1990. Table 1 shows the cumulative capacity available, according to the 1983 budget plan, up to a total of 750 million barrels of capacity. 1/

INTERIM STORAGE PLANS

Current oil market conditions, with excess supply and weak prices, may provide an opportunity to purchase oil at the higher rate specified by the Congress. Unfortunately, the schedule for preparing the chosen sites to create a 750 million barrel reserve cannot be accelerated significantly, and is therefore incompatible with the legislated goal of a 300,000 B/D fill rate. In order to reach the Congressional goal, an alternative capacity plan would be needed. Temporary storage capacity--such as tank farms or tanker ships--could be leased or purchased to store the oil while underground storage facilities were developed as scheduled. As permanent underground capacity became available, the oil could be moved from the temporary facilities.

1/ Although the Congress authorized a 1 billion barrel reserve, plans for the last 250 million barrels are not complete.

TABLE 1. FISCAL YEAR 1983 BUDGET PLAN FOR SPR CAPACITY (Millions of barrels) a/

	Capacity Added	Total	Oil Accumulated
1982		267	267
1983	68	343	343
1984	76	417	400
1985	74	456	456
1986	39	538	538
1987	82	598	598
1988	60	623	623
1989	25	670	670
1990	47	750	750
	80		

NOTE: Totals may not add due to rounding.

a/ This table does not address any SPR plans exceeding 750 MMB.

By leasing excess surplus capacity—either steel tanks or very large crude carriers—DOE could accommodate the 300,000 B/D goal. At that rate, the SPR would accumulate 500 million barrels by 1985 and 750 million barrels by 1987. The current DOE plans, on the other hand, do not envisage reserves of these sizes until 1986 and 1990, respectively. Table 2 compares the total SPR oil accumulation for three plans. The first plan represents the oil accumulation rate proposed in the fiscal year 1983 budget. The second accumulates oil at 300,000 B/D up to 500 million barrels, storing excess oil until permanent capacity becomes available and then reverting to the President's schedule. This would require using temporary storage between 1983 and 1985, with a peak requirement of 70 million barrels of temporary capacity. The third plan accumulates oil at the 300,000 B/D rate up to 750 million barrels, requiring temporary capacity to hold excess oil between 1983 and 1989. In that case, a maximum of 167 million barrels of interim capacity would be required in 1986.

Cost of Interim Storage. Leasing temporary capacity is costly, however. Estimates from industry and DOE place such costs at between $1.00 and $4.00 per barrel per year, depending on staffing, operation, status, and security requirements set forth in the contracts. The lower estimates assume foreign crews on foreign flag vessels and represent industry estimates based on current market conditions. The higher estimates reflect the

TABLE 2. SPR CAPACITY (Millions of barrels) a/

	FY 1983 Budget Plan			300,000 B/D to 500 MMB b/		300,000 B/D to 750 MMB b/	
	Capacity Added	Total	Oil Accumulated	Oil Accumulated c/	Cumulative Temporary Storage Required	Oil Accumulated	Cumulative Temporary Storage Required
1982	68	267	267	267	---	267	---
1983	76	343	343	376	33	376	33
1984	74	417	400	487	70	487	70
1985	39	456	456	500	44	596	140
1986	82	538	538	538	---	705	167
1987	60	598	598	598	---	750	152
1988	25	623	623	623	---	---	127
1989	47	670	670	670	---	---	80
1990	80	750	750	750	---	---	---

NOTE: Totals may not add due to rounding.

a/ This table does not address any SPR plans exceeding 750 MMB.

b/ 300,000 B/D fill rate begins October 1, 1982.

c/ In this scenario, after 500 MMB are accumulated, oil acquisition reverts to the fiscal year 1983 budget plan.

cost of utilizing U.S. vessels. To the extent that on-shore steel tank facilities are available for leasing, their costs also fall within this range. The following analysis used an average interim storage cost of $2.70 per barrel per year.

THE COST OF ACCELERATING OIL ACQUISITION

If accelerated acquisition options are to reduce total program costs, the price of oil at the time permanent storage becomes available must exceed the sum of the cost of the oil when acquired and the cost of temporary storage. Any additional costs from accelerating oil acquisition would need to be balanced against the earlier protection the additional oil would provide.

Higher Carrying Costs. To the extent that a higher fill rate for the SPR implicitly requires additional government borrowing, the finance charges are appropriately included in the cost comparisons. Even though such interest costs are not borne by the SPR program itself, they are a significant consideration in assessing the level of government expenditures. In the cases discussed here, the interest costs represent a major contribution to the net cost of the accelerated oil acquisition options. 2/

Future Price Paths. The Administration is currently requesting approximately $11.9 billion for oil purchasing between 1983 and 1987, for the accumulation of 600 million barrels of oil by 1987. Such cost estimates depend, however, on assumptions about future oil prices. To compare the costs of the current plan to those of two alternatives, three oil price paths were used for the 1980s. A "high" price path assumes 3 percent annual growth in the real price of oil beyond the current period of level prices. A "level" price path assumes nearly level real oil prices in the short term and 1 percent annual increases later in the decade. Finally, a "volatile" price path assumes that the price of oil drops by 15 percent annually until 1985, remains level for one year, and then increases by 15 percent annually until 1990. Table 3 shows these oil price paths in both current and 1982 dollars.

Under these price paths, the cost of raising the SPR level to 500 million barrels of oil, if acquired at the rate proposed in the Administration's 1983 budget, would range from $6.7 billion to $9.9 billion depending on the price path used. Similarly, if the reserve was built up to 750

2/ The interest costs considered in this paper apply only to the costs of oil and interim storage beyond those costs suggested by the President's proposal.

TABLE 3. OIL PRICE PATHS (Dollars per barrel) a/

	High	Level	Volatile
	Current Dollars		
1982	34.25	34.25	34.25
1983	37.86	35.46	31.44
1984	41.58	37.84	28.70
1985	45.50	40.15	26.08
1986	49.44	42.84	27.60
1987	53.71	45.62	33.28
1988	58.26	48.49	40.11
1989	63.27	51.68	48.43
1990	68.72	55.03	58.53
	1982 Dollars		
1982	34.25	34.25	34.25
1983	35.75	33.02	29.27
1984	36.27	33.02	25.04
1985	37.33	33.02	21.44
1986	38.42	33.29	21.44
1987	39.54	33.60	24.50
1988	40.69	33.94	28.02
1989	41.88	34.25	32.06
1990	43.11	34.58	33.11

a/ Including transportation costs.

million barrels according to this schedule, oil costs would range from $17.7 billion to $25.0 billion. Expressed in 1982 dollars, these ranges become $5.8 billion to $8.5 billion for the 500 million barrel plan, and $12.9 bilion to $18.8 billion for the 750 milion barrel plan. Under current plans, the underground capacity costs would represent an additional $2 to $4 billion in 1982 dollars. This permanent capacity will be needed in any of the options discussed here, and its costs are therefore not included in the comparisons.

The price paths were also used to analyze the costs and budgetary effects of utilizing temporary storage. Tables 4 and 5 show the cost of oil alone for each oil price path, in both current dollars and 1982 dollars. These costs are shown for increments of 232 million barrels of oil--to reach a total of 500 million barrels--and of 482 million barrels--to reach 750 million.

TABLE 4. SPR COSTS TO 500 MILLION BARRELS (Billions of dollars) a/

Price Path	High	Level	Volatile
	Current Dollars		
FY 1983 Plan	9.9	8.9	6.7
300,000 B/D Plan	9.3	8.6	7.0
300,000 B/D Plan Plus Temporary Storage and Financing Costs b/	10.6	9.8	8.2
	1982 Dollars		
FY 1983 Plan	8.5	7.6	5.8
300,000 B/D Plan	8.4	7.7	6.3
300,000 B/D Plan Plus Storage and Financing Costs b/	9.5	8.8	7.3

a/ Excluding permanent capacity constrution costs.

b/ Temporary storage costs start at $2.70 per barrel per year in 1982.

In building a 750 million barrel reserve, as seen in Table 5, the cost of the oil itself is lower if purchased at a rate of 300,000 barrels per day rather than at the fiscal year 1983 SPR schedule. In 1982 dollars, for example, the oil costs under the current SPR plan to accumulate 750 million barrels range from $12.9 billion to $18.8 billion. At 300,000 barrels per day, on the other hand, the costs range from $11.7 billion to $17.9 billion. As seen in Table 4, oil costs are not generally lower if purchased at the 300,000 B/D rate up to the 500 million barrel level.

Once the additional costs for temporary storage and the implicit finance charges are considered, however, utilizing temporary storage is more costly in all cases. Tables 4 and 5 also compare the cost of oil under the current SPR plan to the cost of oil, temporary storage, and finance charges if temporary storage is used, for the three price paths. Taking the high price path, for example, the oil cost in 1982 dollars under the current SPR plan would be approximately $18.8 billion to reach 750 million barrels. Purchasing oil at 300,000 barrels per day would result in oil costs of

TABLE 5. SPR OIL COSTS TO 750 MILLION BARRELS (Billions of dollars) a/

Price Path	High	Level	Volatile
	Current Dollars		
FY 1983 Plan	25.0	21.4	17.7
300,000 B/D Plan	21.5	19.2	14.0
300,000 B/D Plan Plus Temporary Storage and Financing Costs b/	28.6	26.1	19.9
	1982 Dollars		
FY 1983 Plan	18.8	16.2	12.9
300,000 B/D Plan	17.9	16.0	11.7
300,000 B/D Plan Plus Storage and Financing Costs b/	23.1	21.1	16.1

a/ Excluding permanent capacity construction costs.

b/ Temporary storage costs start at $2.70 per barrel per year in 1982.

approximately $17.9 billion. This $0.9 billion cost advantage is lost however, when temporary storage costs of approximately $2 billion in 1982 dollars, are added. In addition, the additional early oil purchases would result in finance charges of approximately $3 billion in 1982 dollars, if they were explicitly accounted for. Thus, the total additional costs of building a 750 million barrel reserve at a fill rate of 300,000 B/D are in the range of $3 to $5 billion if expressed in 1982 dollars (see Table 5), depending on the oil price path assumed.

Budgetary Effects. In 1981, to help insulate the SPR program from the pressures of the annual budget process, expenditures for oil purchases were moved outside the unified budget. Such off-budget expenditures have the same economic impact as if they were on-budget. Further, this budgetary treatment tends to obscure the real streams of revenues and costs. The costs of storage capacity construction remain on-budget.

Interim storage costs would therefore probably be considered on-budget unless specifically provided for from the off-budget SPR oil acquisition account. The financing costs would appear as interest on the public debt, currently accounted for separately, but on-budget. Tables 6 and 7 summarize the off-budget impact of accelerated oil purchases, compared with the fill rate proposed in the fiscal year 1983 budget, using the three oil price paths. They show, for example, that acquiring oil at 300,000 B/D shifts the

TABLE 6. ESTIMATED OFF-BUDGET IMPACT OF 300,000 BARRELS PER DAY FILL RATE UP TO 500 MILLION BARRELS (Billions of dollars) a/

	1982	1983	1984	1985	1986	1987
Level Oil Price Path						
Estimated Authorization Level	+0.1	+1.5	+1.4	-2.9	-0.1	---
Estimated Outlays	---	+1.0	+2.1	-1.0	-2.1	---
High Oil Price Path						
Estimated Authorization Level	+0.2	+1.6	+1.4	-3.2	-0.1	---
Estimated Outlays	---	+1.1	+2.3	-1.2	-2.3	---
Volatile Oil Price Path						
Estimated Authorization Level	+0.1	+1.3	+1.1	-1.7	-0.1	---
Estimated Outlays	---	+0.9	+1.7	-0.6	-1.3	---

NOTE: These figures include the cost of oil and interim storage, but not implicit finance charges of approximately $0.8 to $0.9 billion.

a/ Relative to the off-budget cost associated with the fill rate proposed in the President's fiscal year 1983 budget, for each oil price path.

off-budget obligations and outlays closer to the present. In all cases, with the temporary storage costs included in the off-budget estimates, the savings realized from earlier oil purchases are entirely offset by the temporary storage costs. These tables, however, do not include the additional on-budget expenditures of $0.8 billion to $4.3 billion for interest on the public debt due to the forward shifting of outlays.

TABLE 7. ESTIMATED OFF-BUDGET IMPACT OF 300,000 BARRELS PER DAY FILL RATE UP TO 750 MILLION BARRELS THROUGH FISCAL YEAR 1990 (Billion of dollars) a/

	1982	1983	1984	1985	1986	1987	1988	1989	1990
Level Price Path									
Budget Authority	+0.1	+1.5	+3.0	+1.2	+1.7	-1.3	-1.3	-3.1	-2.2
Outlays	---	+1.0	+2.1	+2.6	+1.8	+0.2	-0.8	-1.9	-4.1
High Price Path									
Budget Authority	+0.2	+1.6	+3.3	+2.4	+1.8	-1.6	-1.7	-4.0	-2.7
Outlays	---	+1.1	+2.3	+2.9	+2.0	+0.1	-1.1	-2.4	-5.1
Volatile Price Path									
Budget Authority	+0.1	+1.3	+2.2	+1.6	+1.3	-0.8	-1.2	-3.2	-2.3
Outlays	---	+0.9	+1.7	+1.9	+1.4	+0.3	-0.6	-1.8	-4.3

NOTE: These figures include the cost of oil and interim storage, but not implicit finance charges of approximately $4.1 billion for the level oil price path, $4.3 billion for the high oil price path, and $3.1 billion for the volatile oil price path.

a/ Relative to the off-budget cost associated with the fill rate proposed in the President's fiscal year 1983 budget, for each oil price path.

The calculations show that accelerating oil purchases would probably increase total program costs in constant or in current dollars. Utilizing temporary storage, however, buys additional protection at an earlier time, satisfying a basic goal of the SPR program. Furthermore, while spending money to acquire oil may restrict the funds available for other programs, such spending represents the acquisition of a capital asset in the form of oil. To the extent that oil prices remain firm over the long run, the asset retains both its value and a high degree of liquidity.

The calculations also show that while, for any one oil price path, utilizing temporary storage would probably prove more expensive than following the current schedule, the differences between oil price paths lead to greater uncertainties. Following, for example the "volatile" price path, building the 750 million barrel stockpile at 300,000 B/D and using temporary storage would cost $16.1 billion in 1982 dollars, including the costs of oil, temporary storage (at $2.70 per barrel per year), and financing. This would be about $3.2 billion more than if the current plan was followed, or about $6.70 per barrel of oil yet to be placed in the reserve.

There is, however, approximately a $6 billion difference, or $12 per barrel, between the "volatile" and the "high" oil price scenarios. The variation due to the uncertain price path of oil is therefore greater than the additional cost of utilizing temporary storage. Since the SPR is an insurance program, intended to minimize the impacts of oil market disruptions, this uncertainty must be taken into account in comparing the alternatives.

THE BENEFITS OF ADDITIONAL PROTECTION

The security of U.S. imported oil supplies depends upon a number of political and economic factors. These include the level and source of U.S. imports, the tightness of the world oil market, the political stability of the oil-exporting countries, and their relations with the United States. As the United States recovers from the current recession, a large portion of the ensuing increases in domestic oil demand will likely be met with additional imports. Further, worldwide economic recovery may tighten the world oil market.

An uninterrupted supply of foreign oil is by no means certain. In fact, such events as the Iranian Revolution in 1979 and the Iraq-Iran war point to the likelihood of future supply interruptions. Not only is the supply of oil unreliable, but the size of the cutoff is potentially large. The United States imports about one-third of its crude oil and refined petroleum products. Ten percent of U.S. consumption comes from the Persian Gulf. Europe and

Japan are even more dependent on oil imports from the Persian Gulf. Thus, if Gulf exports ceased, these nations would have to acquire their petroleum from other sources. Inevitably, they would begin bidding for oil on the remaining world oil market, forcing up world prices. Remaining foreign suppliers might also divert some oil from the United States to other customers. Thus, not only are U.S. imports large, but they are vulnerable to events outside the immediate trading sphere of the United States.

An oil disruption would first reduce the output of U.S. manufacturing and other firms that require oil products for their various processes, which in turn would reduce the output of other firms. At the same time world oil prices would rise significantly, and oil producers, both domestic and foreign, would reap a premium (the additional price paid for the oil still being produced). The price increases would further depress the U.S. economy as large amounts of money--the shortage premium--were transferred from domestic consumers to foreign and domestic producers, leaving consumers with less money to buy goods and services. Inflation would rise as the higher oil prices rippled down through the economy, first through refined petroleum products and then through all the other products dependent on petroleum inputs. Once again, as in the 1970s, the U.S. economy could face lower output, higher unemployment, and higher inflation simultaneously.

Previous CBO studies have addressed the economic impacts of oil supply interruption. 3/ A year-long, 2.5 million barrel per day shortfall to the United States, for example, could be expected to cause a loss of more than 4 percent in gross national product, increase unemployment by almost 2 percent, and raise the price level by an additional 7 percent the first year. A 1 billion barrel SPR, as authorized by the Congress, could offset this entire shortfall.

Table 8 presents estimated SPR oil levels under the current Administration plan and under the 300,000 B/D fill rate. As seen in this table, the use of a 300,000 B/D fill rate creates an SPR inventory up to 31 percent larger than the projected base case in years 1985 and 1986. The accelerated fill of the reserve results in approximately an extra month's protection against a disruption of all oil imports for the years 1985 through 1988. Moreover, the accelerated rate of fill allows completion of the 750 million barrel reserve three years ahead of schedule.

3/ Managing Oil Disruptions, Issues and Policy Options (September 1981), and An Evaluation of the Strategic Petroleum Reserve (June 1980).

TABLE 8. ANNUAL SPR OIL INVENTORY LEVEL UNDER ALTERNATE PLANS

Year	Fiscal Year 1983 Plan	300,000 B/D to 750 MMB	Percentage of Increase	Extra Days' Imports a/
1982	267	267	0	
1983	343	376	10	7
1984	400	487	22	17
1985	456	596	31	28
1986	538	705	31	33
1987	598	750	25	30
1988	623	750	20	25
1989	670	750	12	16
1990	750	750	0	0

a/ Computed at 5.0 million barrels per day for the 1982-1990 period.

SUMMARY

The oil market, while currently exhibiting much surplus production capacity, remains unstable. Political events in the Middle East or Northern Africa could disrupt supplies. A strong worldwide economic recovery could lead to tighter oil markets and rising prices. The Congress, realizing that future oil market conditions are not predictable, established the SPR in order not to leave the U.S. economy vulnerable to oil supply interruptions. An opportunity exists now to take advantage of slack oil market conditions to achieve the legislated goal of acquiring 300,000 barrels per day. To do so, however, would require measures to increase the present capacity of the SPR so as to allow a more rapid rate of oil acquisition.

Leasing temporary storage facilities or ships could provide an effective way to acquire oil quickly and proceed with the existing DOE plans. Such a policy would involve additional costs, but would provide additional protection sooner. The likely costs of implementing these options are, however, less than the costs introduced by alternative oil price assumptions.